WHAT IS CLAIMED IS:

1. A method to monitor distortions in a turbine casing having at least a shell arm portion, a support key, and a shell standard support comprising:

a. positioning a plurality of sensitive gap sensors on a surface of the shell standard support which supports the shell portion;

b. each gap sensor monitoring a gap between the shell arm portion and the shell standard support, wherein the gap is between the surface of the shell arm portion and an opposing surface of the shell standard support;

c. collecting data regarding the gap dimension for a period of time;

d. determining changes in planar shell arm slope over the period of time based on the collected data, wherein the shell arm slope is indicative of the data collected from the gap sensors at a certain period of time, and

e. reporting changes to the slope the gap over the certain period of time.

2. A method as in claim 1 further comprising identifying rapid changes in the slope as indicating a substantial change in pipe loading on the casing.

3. A method as in claim 1 wherein each gap sensor is a non-contact capacitive probe.

4. A method as in claim 1 wherein there are at least three gap sensors in a gap between a shell arm support and a shell standard support, wherein the shell arm portion is attached to the shell and the shell standard support is mounted to a turbine foundation.

5. A method as in claim 4 wherein the gap sensors are positioned on opposite sides of the key between the shell arm support and the shell standard support.

6. A method as in claim 1 wherein the shell arm slope change is a planar slope change of the shell arm.

7. A method as in claim 1 wherein the shell arm slope change is a slope change of a plane between a shell arm support and a shell standard support of the turbine casing.

8. A method as in claim 1 wherein the plurality of gap sensors is at least three non-contact, and the shell arm support slope change is the slope change of a plane defined by the three gap sensors.

9. A method as in claim 8 wherein the three probes are positioned around the key between a shell arm support and a shell standard support.

10. A method to monitor distortions in a turbine casing having at least a shell arm support, key, and shell standard support, said method comprising:

a. positioning at least three gap sensors on a surface of the shell standard support and below the shell arm support;

b. each gap sensor monitoring a gap between the shell arm support and the shell standard support;

c. collecting data regarding a change in shell arm slope for a period of time;

d. detecting changes in the shell arm support slope of the gap over the certain period of time, and

e. determining whether the casing has been excessively deflected based on the changes in the slope of the shell arm support.

11. A method as in claim 10 further comprising identifying a rapid change in the slope as an indication of a substantial change in pipe loading on the casing.

12. A method as in claim 10 wherein each gap sensor is a non-contact probe.

13. A method as in claim 10 wherein the gap sensors are positioned on opposite sides of the key between the shell arm support and the shell standard support.

14. A method as in claim 10 wherein the change in shell arm slope is a slope change of a plane within the gap.

15. A method as in claim 10 wherein the slope of the shell arm support is a slope change of a plane defined by the gap.

16. A method as in claim 10 wherein the plurality of gap sensors is at least three non-contact probes.

17. An apparatus to monitor deflections in a turbine casing having at least a shell arm support, key, and shell standard support, said apparatus comprising:

a plurality of gap sensors arranged on a shell standard support surface, wherein the support surface supports the key and turbine shell;

each of said plurality of gap sensors generating a gap signal indicative of a gap dimension between the standard support surface and said shell arm support, and

a controller receiving the gap signal from each of the plurality of gap sensors, wherein said controller generates output data regarding the gap dimension.

18. An apparatus as in claim 17 wherein the plurality of gap sensors are each a non-contact probe.

19. An apparatus as in claim 17 wherein the gap sensors are positioned on opposite sides of the key between the standard shell support and said shell arm support.

20. An apparatus as in claim 17 wherein the output data includes information identifying change in shell arm planar slope.